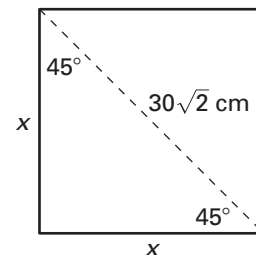


Study Guide

For use with pages 482–487

GOAL Use special right triangles to solve problems.**EXAMPLE 1** Using a 45°-45°-90° Triangle

You are building corner shelves out of a square piece of wood. You cut along the diagonal of the square to produce two right triangles, each with a hypotenuse of $30\sqrt{2}$ centimeters. What is the side length x of each shelf?

**Solution**

The diagonal divides the piece of wood into two 45°-45°-90° triangles. The diagonal is the hypotenuse of each triangle.

$$\text{hypotenuse} = \text{leg} \cdot \sqrt{2}$$

Rule for 45°-45°-90° triangle

$$30\sqrt{2} = x\sqrt{2}$$

Substitute.

$$\frac{30\sqrt{2}}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$$

Divide each side by $\sqrt{2}$.

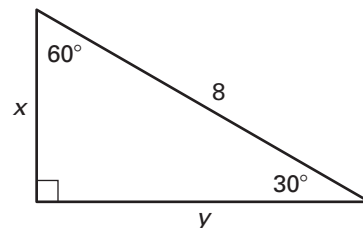
$$30 = x$$

Simplify.

Answer: The side length of each shelf is 30 centimeters.

EXAMPLE 2 Using a 30°-60°-90° Triangle

Find the length x of the shorter leg and the length y of the longer leg of the triangle.

**Solution**

The triangle is a 30°-60°-90° triangle. The length of the hypotenuse is 8 units.

a. $\text{hypotenuse} = 2 \cdot \text{shorter leg}$

$$8 = 2x$$

Substitute.

$$\frac{8}{2} = \frac{2x}{2}$$

Divide each side by 2.

$$4 = x$$

Simplify.

Answer: The length x of the shorter leg is 4 units.

b. $\text{longer leg} = \text{shorter leg} \cdot \sqrt{3}$

$$y = 4\sqrt{3}$$

Substitute.

Answer: The length y of the longer leg is $4\sqrt{3}$ units.

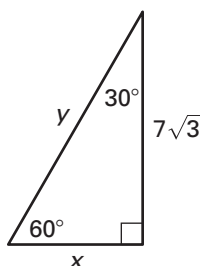
Study Guide

For use with pages 482–487

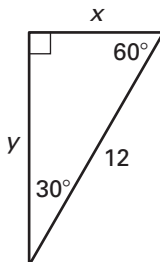
Exercises for Examples 1 and 2

Find the unknown lengths. Write your answers in simplest form.

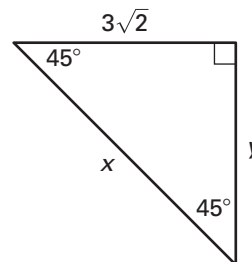
1.



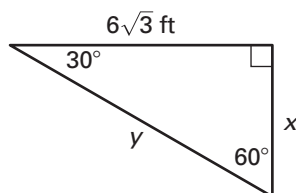
2.



3.

**EXAMPLE 3 Using a Special Right Triangle**

Your neighbors have a 30° - 60° - 90° triangular garden in the corner of their yard. The length of the longer leg of the triangle is $6\sqrt{3}$ feet. Find the lengths of the other sides of the triangle to the nearest foot.

**Solution**

You need to find the length of the shorter leg first.

(1) Find the length x of the shorter leg.

$$\text{longer leg} = \text{shorter leg} \cdot \sqrt{3}$$

$$6\sqrt{3} = x \cdot \sqrt{3}$$

$$6 = x$$

Rule for 30° - 60° - 90° triangle

Substitute.

Divide each side by $\sqrt{3}$.(2) Find the length y of the hypotenuse.

$$\text{hypotenuse} = 2 \cdot \text{shorter leg}$$

$$y = 2 \cdot 6$$

$$= 12$$

Rule for 30° - 60° - 90° triangle

Substitute.

Multiply.

Answer: The length of the shorter leg of the triangle is 6 feet. The length of the hypotenuse is 12 feet.

Exercise for Example 3

4. Find the lengths of the other two sides of the garden in Example 3 if the hypotenuse is 16 feet.